

MR1035-1386

Application Serial No. 10/777,168

Responsive to Office Action dated 22 July 2004

### **AMENDMENTS TO THE DRAWINGS**

The attached sheets of Drawings include changes to Figs. 1 and 2. These sheets, including Figs. 1 and 2, replace the original sheets including Figs. 1 and 2. In Figs. 1 and 2, the previously omitted reference numeral "40" has been inserted.

**Attachment:        Replacement Sheets.**

**REMARKS/ARGUMENTS**

This case has been reviewed and analyzed in view of the Official Action dated 22 July 2004. Responsive to the rejections made by the Examiner in the outstanding Official Action, Claims 1, 7, 8, 16, 21, and 22 have been amended and Claim 23 has been inserted in order to more clearly clarify the inventive concept of the Applicant.

The Examiner has objected to the Drawings under 37 C.F.R. § 1.83(a) as not showing every feature of the invention specified in the Claims. The Examiner has specifically objected to the “different film coating condition” of Claim 16 and the “different mirrors” of Claims 21 and 22. Claims 16, 21, and 22 have now been amended and it is believed that the amended form of Claims 16, 21, and 22 now more clearly conforms with what is shown in Figs. 1 and 2, thus satisfying the requirements of 37 C.F.R. § 1.83(a). No new subject matter has been inserted.

The Examiner has further objected to the Drawings for not including a reference numeral for the “polarization selection device or a polarizer”. A set of Substitute or Replacement Sheets for Figs. 1 and 2 is being submitted for the Examiner’s approval with this Amendment. The new Figs. 1 and 2 include a reference numeral “40” for the “polarization selection device or a polarizer”. The Examiner has similarly objected to the Specification for not including a reference numeral for the “polarization selection device or a polarizer” cited on Page 7, Lines 17-20. The Specification has now been amended to include reference numeral “40”. It is now believed that both the Drawings and the

Specification satisfy the rules and requirements of the USPTO regarding Drawings and Specifications. No new subject matter has been inserted.

The Examiner has further objected to Claims 7 and 8 due to both being apparently identical. Claims 7 and 8 have now been amended in order to more clearly clarify the distinction of what is being claimed in each Claim. Claim 7 is directed to an s-p polarization conversion device which is utilized for converting the polarity of the incident light between a s-state and a p-state. Claim 8 is directed to a polarization selection component which is utilized for initially polarizing the incident light. Claim 7 is for converting already polarized light and Claim 8 is directed to the initial polarization of the incident light. It is thus believed that Claims 7 and 8 now conform with the Examiner's requirements.

The Examiner has further objected to Claim 16 due to grammatical confusion in Claim 16 as originally filed. Claim 16 has now been amended and is believed that Claim 16 now conforms with the Examiner's requirements.

It is respectfully noted that the Examiner has stated that Claim 2 was merely objected to as being dependent upon a rejected base Claim, but would be allowable if rewritten in Independent form including all of the limitations of the base Claim and any intervening Claims. Newly-inserted Claim 23 includes the elements of Claim 1 combined with the limitations of Claim 2. Thus, it is believed that Independent Claim 23 has been placed in condition for allowance, and such action is respectfully requested.

Prior to a discussion of the further objections and rejections made by the Examiner in the outstanding Official Action, it is believed that it may be beneficial to briefly review the subject Patent Application system in light of the inventive concept of the Applicant. The subject Patent Application is directed to a reflective type light valve projection device. As shown in Fig. 1 of the Drawings, light source 10 produces white light which, initially, passes through the beam splitting region of first dichroic beam splitter/combiner 12. Each beam splitter/combiner 12, 14 consists of two regions: a beam splitting region and a beam combining region. Each region is coated with a splitter or combiner optical film, respectively. The white light passing through the first dichroic beam splitter/combiner 12 has red light split or reflected from the beam splitter region which is then reflected by red light valve 16 onto the beam combiner region of the first dichroic beam splitter/combiner 12. The beam passing through element 12 then intersects with the beam splitting region of the second dichroic mirror 14. As shown in Fig. 1, green light is reflected off of the beam splitting region, is reflected from the green light valve 18, and intersects with the beam combining region of the second dichroic beam splitter/combiner 14.

As further illustrated in Fig. 1, the blue light passes through both dichroic beam splitter/combiners and reflects from blue light valve 20. All three primary colors of light pass through polarizing device 40 before reaching the projection lens 30.

The Examiner has rejected Claims 1, 3-5, and 15 under 35 U.S.C. § 102(b) as being anticipated by the Hatanaka Patent #5,451,103. It is the Examiner's contention that all elements of Claims 1, 3-5, and 15 as originally filed are taught by the Hatanaka reference.

The Hatanaka reference is directed to a projector system. As shown in Fig. 1, the projector includes a white light source 10, a first dichroic mirror 11 for reflecting only the red light component of the light emitted from the light source, a second dichroic mirror 12 for reflecting only the blue light component of the light transmitted through the first dichroic mirror 11 and a first liquid crystal plate 13 of the reflection type. The Hatanaka reference, however, utilizes the dichroic mirrors 11, 12 which are uniform plates of dichroic mirror.

In the Hatanaka reference, each dichroic mirror forms a single region which performs both beam splitting and beam combining. In contradistinction, in the system of the subject Patent Application, although beam splitting and combining are performed utilizing the same respective mirror, the splitting and combining functions are accomplished in different or separate regions of each dichroic beam splitter/combiner. Due to the difference in incident angles for both beam splitting and beam combining, the requirements of the thin film optical coating on each region differ. The system of the subject Patent Application utilizes separate beam splitting and beam combining regions, having separate coatings, allowing for optimal splitting and combining of the light beams,

providing for less light loss and less destructive interference of the light during the splitting/combining processes.

Further, in the system of the subject Patent Application, the two reflectors 16 and 20 are positioned symmetric with respect to the axis of the dichroic mirror 12. Additionally, the reflectors 18, 20 are positioned symmetric with respect to the axis of dichroic mirror 14. This symmetry, and subsequent equality of light path distances, provides for greater control over light loss and destructive interference, and minimizes these effects in order to produce the sharpest image possible.

Thus, the Hatanaka reference does not provide for: "...each of said first and second dichroic beam splitter/combiners having separate and distinct beam splitting and beam combining regions formed thereon and being formed in one-piece formation, each said beam splitting region being coated with a first optical film layer for separating a respective primary color of light from incident light, each said beam combining region being coated with a second optical film layer for combining a respective primary color of light with a transmitted light ray...", as is clearly provided by newly-amended Independent Claim 1. Further, the Hatanaka reference does not provide for: "...wherein said first light valve and said third light valve are symmetrically arranged with said first dichroic beam splitter/combiner as the reference plane, and said third light valve and said second light valve are symmetrically arranged with said second dichroic beam

splitter/combiner as the reference plane...”, as is clearly provided by newly-inserted Independent Claim 23.

Thus, based upon newly-amended Independent Claim 1 and newly-inserted Independent Claim 23, it is not believed that the subject Patent Application is anticipated by, or made obvious by, the Hatanaka reference when Independent Claims 1 and 23 are carefully reviewed.

The Examiner has additionally rejected Claims 1, 3-6, 12-16, and 18-22 under 35 U.S.C. § 102(b) as being anticipated by the Scott Patent #6,046,858. It is the Examiner's contention that all elements of Claims 1, 3-6, 12-16, and 18-22, as originally filed, are taught by the Scott reference.

The Scott reference is directed to a light separation and recombination system for an off-axis projector. As shown in Fig. 4, visible light from mirror 410 passes through condenser lens 314 and is then separated into blue, green, and red components by crossed dichroic filters 415B and 415R. In addition to separation the illumination beam into blue, green, and red bundles, dichroic filters 415B and 415R also recombine the blue, green, and red bundles after they are individually modulated in the respective blue, green, and red channel optics 420B, 420G, and 420R.

As shown in Fig. 4, each of the dichroic filters 415R and 415B split and combine light in the same region. That is, each filter or dichroic mirror is one single plane of mirror, with no variation.

In contradistinction, the system of the subject Patent Application utilizes two dichroic mirrors with each dichroic mirror 12, 14 having two separate and distinct regions formed thereon. One region is for beam splitting and one region is for beam recombining, with each region being coated with a separate optical thin film designed for either splitting or combining.

By utilizing two separate regions and, subsequently, two different types of optical thin films formed on each dichroic mirror, the system of the subject Patent Application minimizes light loss and destructive interference of the light passing through the optical system. This, in turn, creates a more accurate, sharper, and brighter image as an end result.

Additionally, the system of the subject Patent Application provides for symmetry between reflectors 16 and 20 about reflector 12 and, similarly, symmetry between reflectors 18, 20 about dichroic mirror 14. This symmetry allows for greater control over possible destructive interference, and provides for great control over equalizing optical path lengths. This results in a sharper image as an end result.

Thus, the Scott reference does not provide for: "...each of said first and second dichroic beam splitter/combiners having separate and distinct beam splitting and beam combining regions formed thereon and being formed in one-piece formation, each said beam splitting region being coated with a first optical film layer for separating a respective primary color of light from incident light, each said beam combining region



being coated with a second optical film layer for combining a respective primary color of light with a transmitted light ray...”, as is clearly provided by newly-amended Independent Claim 1. Further, the Scott reference does not provide for: “...wherein said first light valve and said third light valve are symmetrically arranged with said first dichroic beam splitter/combiner as the reference plane, and said third light valve and said second light valve are symmetrically arranged with said second dichroic beam splitter/combiner as the reference plane...”, as is clearly provided by newly-inserted Independent Claim 23.

Thus, it is not believed that the subject Patent Application is anticipated by, or made obvious by, the Scott reference, when Independent Claims 1 and 23 are carefully reviewed.

The Examiner has additionally rejected Claims 1, 3-5, 7-11, 15, 17, and 18 under 35 U.S.C. § 102(b) as being anticipated by the Sampsell Patent #6,113,239. It is the Examiner’s contention that all elements of Claims 1, 3-5, 7-11, 15, 17, and 18, as originally filed, are taught by the Sampsell reference.

The Sampsell reference is directed to a projection display system for reflective light valves. As shown in Fig. 4 of the Sampsell reference, the projection display system uses four separate dichroic mirrors. Blue transmitting dichroic mirror 84 is fixed to blue reflecting dichroic mirror 86 to form a single plane and similarly, dichroic mirror 88 is matched with dichroic mirror 90 to form a single plane. However, it should be noted that

the Sampsell reference teaches (Column 5, Lines 1-3) "...system 83 includes two dichroic filters (DF) 84, 86, and two polarizing beam splitters (PBS) 88, 90...". Thus, rather than using two dichroic mirrors, in order to ease manufacture and also provide optimal optical alignment, the Sampsell reference utilizes four separate mirror pieces.

In contradistinction, the system of the subject Patent Application uses two dichroic mirrors 12, 14, with each mirror being separated into two separate regions. Though two separate regions are formed on each mirror, each mirror is formed as a single piece, thus easing manufacturing time, labor, and costs, and also ensuring proper optical alignment between the separate regions of the mirrors.

Additionally, in the system of the subject Patent Application, as shown in Fig. 1 of the Patent Application Drawings, transmitted and reflected light of the same frequency intersects separate regions of each dichroic mirror. For example, red light generated by source 10 is reflected from dichroic mirror 12 in only the beam splitting region, and the reflected red light, reflected from LCD 16, impinges only on the beam combining region of the dichroic mirror 12. As shown in Fig. 4 of the Sampsell reference, red light transmitted through mirror 90 is reflected from LCD 92 and is reflected back to mirror 90 along the exact same path that the initial red light passed through. Thus, destructive interference will occur with each reflection. In the system of the subject Patent Application, the light paths are all kept separate from one another, thus minimizing the possibility of any destructive interference.

Additionally, in the system of the subject Patent Application, reflectors 16, 20 are positioned symmetrically with respect to the axis of dichroic mirror 12. Similarly, reflectors 18, 20 are positioned symmetric with respect to the axis of dichroic mirror 14. This allows for great control over the optical path distance and minimizes light loss and optical destructive interference of the light wave signal.

Thus, the Sampsell reference does not provide for: "...each of said first and second dichroic beam splitter/combiners having separate and distinct beam splitting and beam combining regions formed thereon and being formed in one-piece formation, each said beam splitting region being coated with a first optical film layer for separating a respective primary color of light from incident light, each said beam combining region being coated with a second optical film layer for combining a respective primary color of light with a transmitted light ray...", as is clearly provided by newly-amended Independent Claim 1. Further, the Sampsell reference does not provide for: "...wherein said first light valve and said third light valve are symmetrically arranged with said first dichroic beam splitter/combiner as the reference plane, and said third light valve and said second light valve are symmetrically arranged with said second dichroic beam splitter/combiner as the reference plane...", as is clearly provided by newly-inserted Independent Claim 23.

Thus, based upon newly-amended Independent Claim 1 and newly-inserted Independent Claim 23, it is not believed that the subject Patent Application is anticipated

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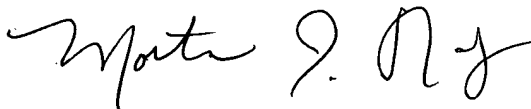
by, or made obvious by, the Sampsell reference, when Independent Claims 1 and 23 are carefully reviewed.

It is now believed that the remaining Claims 2-22 show patentable distinction over the prior art cited by the Examiner for at least the same reasons as those previously discussed for Independent Claim 1.

The remaining reference cited by the Examiner, but not used in the rejection, has been reviewed, but is believed to be further removed when patentable distinctions are taken into account than those cited by the Examiner in the rejection.

It is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Morton J. Rosenberg".

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Dated: 10/21/04

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